University of Colorado at Boulder

JILA

Campus Box 440
Boulder, Colorado 80309-0440
(303) 492-7789
E-mail: reception.desk@jila.colorado.edu
Fax: (303) 492-5235

Professor Margaret M. Murnane
JILA, University of Colorado
Boulder, CO 80309-0440
E-mail: Margaret.Murnane@colorado.edu

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Professor Ilesanmi Adesida
Dean, College of Engineering
University of Illinois, Urbana-Champaign
1308 West Green Street
Urbana, IL 61801
E-mail: iadesida@uiuc.edu

Dear Dr. Adesida:

As Chair of the Committee of Visitors (COV) for the Electrical, Communications and Cyber Systems (ECCS) Division in the Directorate for Engineering, it is my pleasure to send you the attached report from our visit to ECCS on June 22-24, 2011. The COV evaluated 180 proposal e-jackets and other data supplied by the division. We judged the ECCS Division to be highly successful in all aspects we reviewed - in particular, the quality and effectiveness of the merit review process, the broad selection of reviewers, management of the program, and portfolio of awards. The COV also responded to questions regarding agency-wide issues that might be addressed by NSF to help improve the program's performance.

Research supported by the Division more critical than ever to our international competitiveness in engineering science and technological innovation. The Division's proactive engagement in cross-disciplinary research initiatives with other NSF Divisions and agencies have helped diversify the research breadth of ECCS and have inspired new research frontiers. Important initiatives championed by ECCS include science and engineering beyond Moore's law, flexible electronics with primary application emphasis on revolutionizing healthcare, efficient generation and management of energy from the environment, the continuous pursuit of cyber-physical systems to enable solutions to several of the NAE Grand Challenges, and enhanced access to the radio spectrum (EARS). The Division is also to be complimented for its continued successful management of the Foundation-wide NNIN program, that has had a tremendous impact on education, research and technology transfer.

The COV was very impressed by the active and thoughtful management, organization and new initiatives of the ECCS program. We commend the Division Director on the outstanding team he has assembled. The teamwork and strategic coordination involved in the management and operations of EPMD, CCSS and EPAS by the Program Directors is impressive, effective, and visionary. All processes are well managed, staff morale is high and the leadership and enthusiasm of the Division Director and all the PDs help keep ECCS at the forefront of engineering science. The balance and breadth of the award portfolio is excellent, with a diverse awardee and reviewer base, and proposal dwell time well below foundation goals. The Division

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has also responded to the previous 2008 COV by increasing the average award size to >$300K.

The ECCS Division is already actively involved in meeting the challesges it is facing. These include -

Low award rates: The COV is concerned that the increasing number of proposals (1400 annually) combined with low award rates (16% funding rate for unsolicited proposals) could impact the quality of proposals and reviews. If award rates continue to decrease, faculty may react by writing even more proposals, instead of developing and proposing their best ideas. Selection of the best proposals will be difficult, because review panels may also be influenced by low awards rates. Moreover, faculty workload may reduce the quality of engineering science, education, and broader impact in the US, particularly with the increased budget pressures at the state and federal levels.
The previous COV recommended that the annual award amount be raised so that research is not under funded. Therefore, decreasing award amounts to increase the funding rate is not a good strategy. Ideally, additional funding would address the low award rate, since high-quality proposals are currently rejected, and because NSF Engineering sees the most proposal pressure at NSF. Should this not be possible, it is vital that the division, the Directorate for Engineering and NSF act in a strategic and coordinated way. The COV supports the plan of ECCS to monitor progress in other areas of NSF Engineering to move towards a single grant deadline per year, or even to limit the number of proposals a PI can annually submit to any division within engineering. NSF can help by understanding the drivers for the proposal pressure, and by educating universities, PIs, and reviewers that high-quality ideas and broader impact (appropriate to the funding level) are the gold standard at NSF.

Division workload and continuity: The significant growth in workload (from proposal pressure and the need to support interdisciplinary proposals) is stretching the ECCS PDs, whose number has not increased commensurately. Therefore, to maintain excellence in management and merit review it would be helpful if the number of ECCS program directors and science assistants increases – even if only a modest increase of one additional program director. It would also be very helpful for continuity and planning if ECCS had a Deputy Director, as is the case for other divisions within engineering.

Implementing the broader impact merit review criterion: As is the case Foundation wide, there still appears to be confusion in the review base about what is meant by broader impact, what high quality broader impact might look like, and what scope is appropriate for different proposals (single-PI vs center etc.). The PDs in ECCS and other divisions at NSF already inform panels in advance by directing them to appropriate web site locations. There is a need to continue and enhance these efforts by ensuring that every panel begins with a discussion of the merit criteria, including examples of what constitutes good "broader impact."
The COV believes broader impact is very important for NSF funded proposals. It can be in many forms – such as effective outreach to K-12 or the public, increasing the number of women/URMs in ECCS at any level, technology or knowledge transfer to industry, solving a grand challenge problem that impacts other fields, or sparking new lines of experimental research motivated by theoretical breakthroughs etc. Perhaps a series of questions in the review form could prompt high-level critical evaluation of the proposal in terms of Broader Impact. (The COV has examples of such questions in the report). Such questions might help first-time panel members (25%) understand broader impact, while reminding senior reviewers to look for breakthrough, high-impact research with significant broader impact.

Finally, the COV would like to thank the NSF personel who greatly facilited the review, particularly Dana Denick, Dr. Dominique Dagenais and Dr. Robert Trew (the ECCS Division

Director), who all checked in frequently to answer questions. The COV also thanks the presenters and staff who made themselves available for questions and discussions, including Joanne Culbertson, Staff Associate for ENG, the EPMD Program Directors (Dr. Samir El-Ghazaly, Dr. Pradeep Fulay, Dr. Usha Varshney, Dr. John Zavada), the EPAS Program Directors (Dr. Radhakisan Baheti, Dr. George Maracas, Dr. Paul Werbos), the CCSS Program Directors (Dr. Zygmunt Haas, Dr. Andreas Weisshaar), as well as Dr. Lawrence Goldberg who coordinates the National Nanotechnology Infrastructure Network (NNIN).

Please let me know if you require any additional information or clarification. On behalf of the COV, it was a pleasure to be part of this important process for ECCS and the National Science Foundation.

Sincerely,

Margaret Murnane

Margaret M. Murnane
Chair, ECCS COV, 2011

Cc: Dr. Robert Trew
Dr. Thomas Peterson
Dr Kesh Narayanan
Jo Culbertson

Submitted on behalf of the 2011 ECCS Committeee of Visitors
Margaret M. Murnane, Chair
Andreas Cangellaris, COV Co-Chair
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